

An Experimental Study on Ship-Bank Hydrodynamic Interaction Forces

이준기*, 문성배*, 정연철*, 정태권*, 이동섭**, 강일권***

*한국해양대학교 항해학부, **한국해양수산연수원, ***부경대학교 해양생산시스템관리학부

요약 : This paper is mainly concerned with the ship-bank interaction by model test. The experiments for the characteristics of hydrodynamic interaction forces and moments between vessel and bank with a mound were carried out in the seakeeping and maneuvering basin.

핵심용어 : Interaction, Bank effect, Water depth

배경 및 목적

❖ When a large vessel maneuvers in restricted waters:

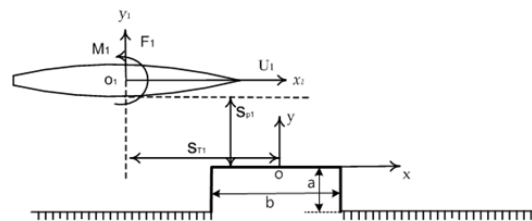
- The problem due to the **shallow water effect** ? Ship maneuvering motion
- **Bank effect / Ship-Ship interaction effect** in congested water areas due to the increasing size and number of large vessel ?
- The **Difference of maneuvering characteristics** in deep and shallow water ?



Main Parameters

- Ship's velocity (U_i)
- Lateral distance (S_{Pl})
- Longitudinal distance (S_{Tl})
- Depth to draft ratio (H/d)
- Length of bank (a & b)
- Shape of bank

Experimental Setup/ Coordinate Systems



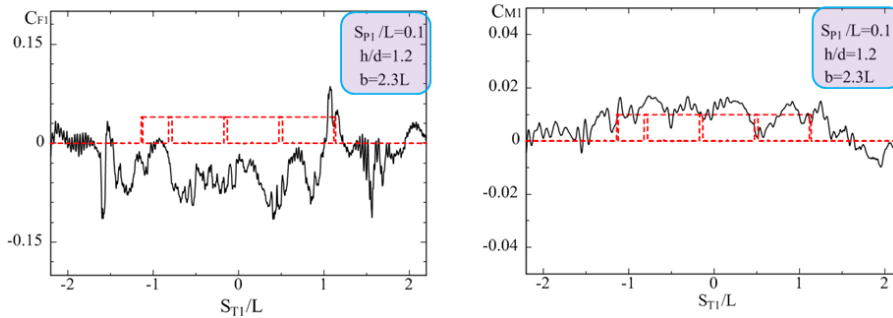
Types with parameters a and b

Types	Length	
	a	b
Type 1	0L	0L
Type 2	0.34L	0.34L
Type 3	0.34L	0.99L
Type 4	0.34L	2.3L

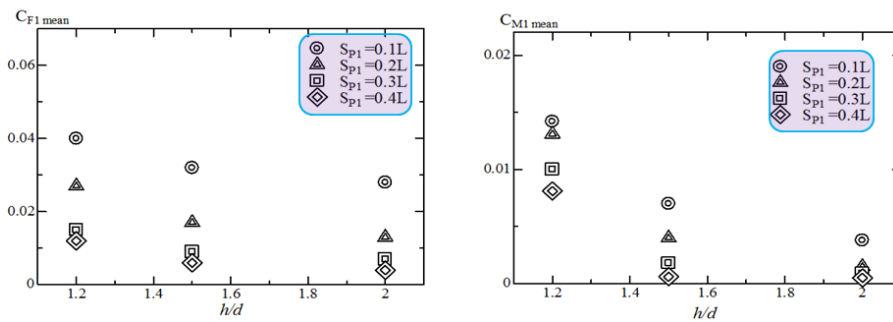


➢Maneuvering and Seakeeping basin in Kyushu Univ. (28m x 25m)

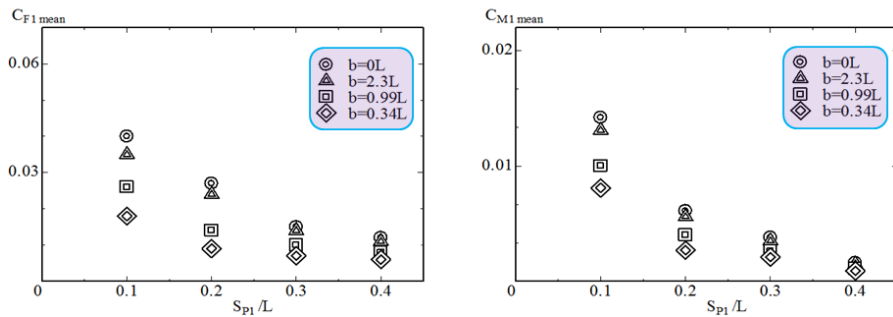
Measured lateral force and yaw moment $b=2.3L$



Measured lateral force and yaw moment



Measured lateral force and yaw moment



Conclusions

❖ Ship-bank hydrodynamic interaction forces were determined by model test

➤ In case of bank effect due to the sidewall with a mound

- Significant changes arose at the leading and ending edge of a mound
- As the length of mound increases the hydrodynamic force and moment increases

➤ When passing at low speed of about 0.41m/s near the sidewall with a mound

- Hydrodynamic force sharply increases as lateral distance between ship and sidewall decreases (when S_{p1} is less than about 0.2L)
- Bank effect dramatically decreases as lateral distance between ship and sidewall increases (when S_{p1} is more than about 0.3L)

➤ In case of this experimental research

- Bank effect without a mound largely increases as water depth decreases (when h/d is lower than about 1.5)